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On the sensitivity of the HAWC observatory to gamma-ray bursts

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Abstract

We present the sensitivity of HAWC to Gamma Ray Bursts (GRBs). HAWC is a very high-energy gamma-ray observatory currently under construction in Mexico at an altitude of 4100 m. It will observe atmospheric air showers via the water Cherenkov method. HAWC will consist of 300 large water tanks instrumented with 4 photomultipliers each. HAWC has two data acquisition (DAQ) systems. The main DAQ system reads out coincident signals in the tanks and reconstructs the direction and energy of individual atmospheric showers. The scaler DAQ counts the hits in each photomultiplier tube (PMT) in the detector and searches for a statistical excess over the noise of all PMTs. We show that HAWC has a realistic opportunity to observe the high-energy power law components of GRBs that extend at least up to 30 GeV, as it has been observed by Fermi LAT. The two DAQ systems have an energy threshold that is low enough to observe events similar to GRB 090510 and GRB 090902b with the characteristics observed by Fermi LAT. HAWC will provide information about the high-energy spectra of GRBs which in turn will lead to understanding about e-pair attenuation in GRB jets, extragalactic background light absorption, as well as establishing the highest energy to which GRBs accelerate particles.

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